

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-3. (Cancelled)

4. (Currently Amended) A laser irradiation apparatus comprising:

a laser oscillator;

a first means for expanding a laser beam emitted from the laser oscillator in a first direction;

a second means for condensing the laser beam in a second direction that is orthogonal to the first direction; and

a third means for providing an object to be irradiated with the laser beam expanded in the first direction and condensed in the second direction with a laser beam irradiation surface and moving the laser beam irradiation surface in the second direction, relative to the laser beam,

~~wherein the laser beam irradiation surface has a cylindrical shape curvature in a direction parallel to the first direction,~~

~~wherein the third means comprises a surface having the cylindrical shape curvature in the first direction,~~

~~wherein the object to be irradiated is placed on the surface,~~

~~wherein the object to be irradiated is placed between a center of the radius of the curvature and the surface, and~~

~~wherein the surface has a side length on the order of 1 m.~~

wherein the cylindrical shape curvature is provided in a negative direction with respect to the direction at which the laser beam advances, and

wherein the second means is provided between the first means and the third means so that focus positions of the laser beam passed through the first means and the second means have the cylindrical shape curvature.

5. (Currently Amended) A laser irradiation apparatus comprising:
a laser oscillator;
a first means for expanding a laser beam emitted from the laser oscillator in a first direction;
a second means for condensing the laser beam in a second direction that is orthogonal to the first direction; and
a third means for providing an object to be irradiated with the laser beam expanded in the first direction and condensed in the second direction with a laser beam irradiation surface and moving the laser beam irradiation surface in the second direction, relative to the laser beam,
wherein the laser beam irradiation surface has a concave shape curvature in a direction parallel to the first direction,
~~wherein the third means comprises a surface having the concave shape curvature,~~
wherein radius of the curvature with respect to a certain focal length of a condenser lens falls within a range of the following two equations:
$$y = 2539.3 \ln(x) - 21447;$$
$$y = 1666.7 \ln(x) - 13098,$$
where y (mm) is focal length of the condenser lens, x (mm) is the radius of the curvature,
~~wherein the object to be irradiated is placed on the surface,~~
~~wherein the object to be irradiated is placed between a center of the radius of the curvature and the surface, and~~
~~wherein the surface has a side length on the order of 1 m.~~
wherein the concave shape curvature is provided in a negative direction with respect to the direction at which the laser beam advances, and
wherein the second means is provided between the first means and the third means so that focus positions of the laser beam passed through the first means and the second means have the concave shape curvature.

6. (Currently Amended) A laser irradiation apparatus comprising:
a laser oscillator;

a first means for expanding a laser beam emitted from the laser oscillator in a first direction;

a second means for condensing the laser beam in a second direction that is orthogonal to the first direction; and

a third means for providing an object to be irradiated with the laser beam expanded in the first direction and condensed in the second direction with a laser beam irradiation surface and moving the laser beam irradiation surface in the second direction, relative to the laser beam,

wherein the laser beam irradiation surface has a concave shape curvature in a direction parallel to the first direction,

~~wherein the third means comprises a surface having the concave shape curvature,
— wherein an object to be irradiated is placed on the surface,
— wherein the object to be irradiated is placed between a center of the radius of the curvature and the surface, and~~

wherein the surface has a side length on the order of 1 m,

wherein the concave shape curvature is provided in a negative direction with respect to the direction at which the laser beam advances, and

wherein the second means is provided between the first means and the third means so that focus positions of the laser beam passed through the first means and the second means have the concave shape curvature.

7. (Original) A laser irradiation apparatus according to claim 4, wherein the first means contains a cylindrical lens array or a cylindrical lens.

8. (Original) A laser irradiation apparatus according to claim 5, wherein the first means contains a cylindrical lens array or a cylindrical lens.

9. (Original) A laser irradiation apparatus according to claim 6, wherein the first means contains a cylindrical lens array or a cylindrical lens.

10. (Original) A laser irradiation apparatus according to claim 4, wherein the second

means contains a cylindrical lens array or a cylindrical lens.

11. (Original) A laser irradiation apparatus according to claim 5, wherein the second means contains a cylindrical lens array or a cylindrical lens.

12. (Original) A laser irradiation apparatus according to claim 6, wherein the second means contains a cylindrical lens array or a cylindrical lens.

13. (Original) A laser irradiation apparatus according to claim 4, wherein the laser oscillator is an excimer laser, a YAG laser, a YVO4 laser, a YLF laser, a YA1O3 laser, or a glass laser.

14. (Original) A laser irradiation apparatus according to claim 5, wherein the laser oscillator is an excimer laser, a YAG laser, a YVO4 laser, a YLF laser, a YA1O3 laser, or a glass laser.

15. (Original) A laser irradiation apparatus according to claim 6, wherein the laser oscillator is an excimer laser, a YAG laser, a YVO4 laser, a YLF laser, a YA1O3 laser, or a glass laser.

16-33. (Cancelled)

34. (Currently Amended) A laser irradiation apparatus according to claim 4, wherein the third means further comprising first and second pins provided in the laser beam irradiation surface, wherein height of the first and second pins are different from each other.

35. (Currently Amended) A laser irradiation apparatus according to claim 5, wherein the third means further comprising first and second pins provided in the laser beam irradiation surface, wherein height of the first and second pins are different from each other.

36. (Currently Amended) A laser irradiation apparatus according to claim 6, wherein

the third means further comprising first and second pins provided in the laser beam irradiation surface, wherein height of the first and second pins are different from each other.

37. (New) A laser irradiation apparatus according to claim 4, wherein the laser beam irradiation surface has a side length on the order of 1 m.

38. (New) A laser irradiation apparatus according to claim 5, wherein the laser beam irradiation surface has a side length on the order of 1 m.

39. (New) A laser irradiation apparatus according to claim 6, wherein the laser beam irradiation surface has a side length on the order of 1 m.

40. (New) A laser irradiation apparatus comprising:
a laser oscillator capable of emitting a laser beam;
a beam expander;
a cylindrical lens; and
a stage,
wherein the beam expander expands the laser beam in a first direction,
wherein the cylindrical lens condenses the laser beam in a second direction that is orthogonal to the first direction,
wherein a surface of the stage has a cylindrical shape curvature in a direction parallel to the first direction,
wherein the cylindrical shape curvature is provided in a negative direction with respect to the direction at which the laser beam advances, and
wherein the cylindrical lens is provided between the beam expander and the stage so that focus positions of the laser beam passed through the beam expander and the cylindrical lens have the cylindrical shape curvature.

41. (New) A laser irradiation apparatus comprising:
a laser oscillator capable of emitting a laser beam;
a beam expander;

a cylindrical lens; and
a stage,
wherein the beam expander expands the laser beam in a first direction,
wherein the cylindrical lens condenses the laser beam in a second direction that is orthogonal to the first direction,
wherein a surface of the stage has a concave shape curvature in a direction parallel to the first direction,
wherein the concave shape curvature is provided in a negative direction with respect to the direction at which the laser beam advances,
wherein the cylindrical lens is provided between the beam expander and the stage so that focus positions of the laser beam passed through the beam expander and the cylindrical lens have the concave shape curvature, and
wherein radius of the concave shape curvature with respect to a certain focal length of a condenser lens falls within a range of the following two equations:
$$y = 2539.3 \ln(x) - 21447;$$
$$y = 1666.7 \ln(x) - 13098,$$
where y (mm) is focal length of the condenser lens, x (mm) is the radius of the curvature.

42. (New) A laser irradiation apparatus comprising:
a laser oscillator capable of emitting a laser beam;
a beam expander;
a cylindrical lens; and
a stage,
wherein the beam expander expands the laser beam in a first direction,
wherein the cylindrical lens condenses the laser beam in a second direction that is orthogonal to the first direction,
wherein a surface of the stage has a concave shape curvature in a direction parallel to the first direction,
wherein the concave shape curvature is provided in a negative direction with respect to the direction at which the laser beam advances, and

wherein the cylindrical lens is provided between the beam expander and the stage so that focus positions of the laser beam passed through the beam expander and the cylindrical lens have the concave shape curvature.

43. (New) A laser irradiation apparatus according to claim 40, wherein the beam expander contains a cylindrical lens array or a cylindrical lens.

44. (New) A laser irradiation apparatus according to claim 41, wherein the beam expander contains a cylindrical lens array or a cylindrical lens.

45. (New) A laser irradiation apparatus according to claim 42, wherein the beam expander contains a cylindrical lens array or a cylindrical lens.

46. (New) A laser irradiation apparatus according to claim 40, wherein the laser oscillator is an excimer laser, a YAG laser, a YVO4 laser, a YLF laser, a YA1O3 laser, or a glass laser.

47. (New) A laser irradiation apparatus according to claim 41, wherein the laser oscillator is an excimer laser, a YAG laser, a YVO4 laser, a YLF laser, a YA1O3 laser, or a glass laser.

48. (New) A laser irradiation apparatus according to claim 42, wherein the laser oscillator is an excimer laser, a YAG laser, a YVO4 laser, a YLF laser, a YA1O3 laser, or a glass laser.

49. (New) A laser irradiation apparatus according to claim 40, wherein the stage further comprising first and second pins provided in the laser irradiation surface, wherein height of the first and second pins are different from each other.

50. (New) A laser irradiation apparatus according to claim 41, wherein the stage further comprising first and second pins provided in the laser irradiation surface, wherein

height of the first and second pins are different from each other.

51. (New) A laser irradiation apparatus according to claim 42, wherein the stage further comprising first and second pins provided in the laser irradiation surface, wherein height of the first and second pins are different from each other.

52. (New) A laser irradiation apparatus according to claim 40, wherein the laser irradiation surface has a side length on the order of 1 m.

53. (New) A laser irradiation apparatus according to claim 41, wherein the laser irradiation surface has a side length on the order of 1 m.

54. (New) A laser irradiation apparatus according to claim 42, wherein the laser irradiation surface has a side length on the order of 1 m.